CLAIMS:

1. A monitoring system comprising:
effluent system;
excitation source in fluid communication with the effluent system; and
at least one sensor in fluid communication with the effluent system.

2. The monitoring system as claimed in claim 1, further comprising at least one mass spectrometer coupled to the effluent system.

3. The monitoring system as claimed in claim 1, wherein said at least one sensor comprises at least one optical sensor.

4. The monitoring system as claimed in claim 3, wherein said at least one optical sensor comprises at least one monochromator.

5. The monitoring system as claimed in claim 1, wherein said at least one sensor comprises at least one mass spectrometer.

6. The monitoring system as claimed in claim 1, wherein said at least one sensor comprises at least one optical sensor and at least one mass spectrometer.

7. A monitoring system comprising:
effluent system;
excitation source in fluid communication with the effluent system; and
monochromator in fluid communication with the effluent system.

8. A method for analyzing gaseous species, the method comprising the steps of:
forming metastable atoms;
colliding a plurality of effluent gaseous species with said metastable atoms to form excited gaseous species; and

identifying said excited gaseous species by measuring light emitted from said excited gaseous species.

9. The method as claimed in claim 8, further comprising the step of using the excited gaseous species to characterize a plasma etching process.

10. The method as claimed in claim 8, wherein the identifying step further comprises the step of measuring the emitted light to identify at least one excited gas molecule.

11. The method as claimed in claim 8, further comprising the step of using the excited gaseous species to characterize at least one of a chemical vapor deposition (CVD) process and a physical vapor deposition (PVD) process.

12. The method as claimed in claim 8, further comprising the step of using the excited gaseous species to characterize an abatement process.

13. The method as claimed in claim 8, further comprising the step of using the excited gaseous species to characterize an endpoint in at least one of a chamber cleaning process and a chamber conditioning process.

14. The method as claimed in claim 8, further comprising the step of using the excited gaseous species to detect a fault in a plasma etching process.

15. The method as claimed in claim 8, wherein the plurality of gaseous species are formed as part of at least one plasma process, the method further comprising creating a process table containing an acceptable range for the excited gaseous species during at least a portion of the at least one plasma process.

16. The method as claimed in claim 15, wherein the method further comprises the steps of:

performing at least one plasma process an additional time;

colliding a plurality of additional effluent gas molecules from the at least one plasma process performed the additional time to produce additional excited gaseous species;

identifying said additional excited gaseous species from the at least one plasma process performed the additional time by measuring light emitted from said excited gaseous species;

characterizing the at least one plasma process performed the additional time using the additional excited gaseous species from the at least one plasma process performed the additional time; and

declaring a fault when the at least one plasma process performed the additional time includes additional excited gaseous species outside of the acceptable range.

17. A method for analyzing gaseous species, the method comprising the steps of:

forming metastable atoms;

colliding a plurality of effluent gaseous species with said metastable atoms to form ionized gaseous species; and

identifying said ionized gaseous species.

18. The method as claimed in claim 17, further comprising the step of using the ionized gaseous species to characterize a plasma etching process.

19. The method as claimed in claim 17, further comprising the step of using the ionized gaseous species to characterize at least one of a chemical vapor deposition (CVD) process and a physical vapor deposition (PVD) process.

20. The method as claimed in claim 17, further comprising the step of using the ionized gaseous species to characterize an abatement process.

21. The method as claimed in claim 17, wherein the identifying step further comprises the step of measuring ion current to identify the gaseous species.

22. The method as claimed in claim 17, further comprising the step of using the ionized gaseous species to characterize an endpoint in at least one of a chamber cleaning process and a chamber conditioning process.

23. The method as claimed in claim 17, further comprising the step of using the ionized gaseous species to detect a fault in a plasma etching process.

24. The method as claimed in claim 17, wherein the plurality of gaseous species are formed as part of at least one plasma process, the method further comprising creating a process table containing an acceptable range for the ionized gaseous species during at least a portion of the at least one plasma process.

25. The method as claimed in claim 24, wherein the method further comprises the steps of:

performing the at least one plasma process an additional time;

colliding a plurality of additional effluent gas molecules from the at least one plasma process performed the additional time to produce additional ionized gaseous species;

identifying said additional ionized gaseous species from the at least one plasma process performed the additional time;

characterizing the at least one plasma process performed the additional time using the additional ionized gaseous species from the at least one plasma process performed the additional time; and

declaring a fault when the at least one plasma process performed the additional time includes additional ionized gaseous species outside of the acceptable range.

26. A method for analyzing gaseous species, the method comprising the steps of:

forming metastable atoms;

colliding a plurality of effluent gaseous species with said metastable atoms to form excited and ionized gaseous species;

identifying said excited gaseous species by measuring light emitted from said excited gaseous species; and

identifying said ionized gaseous species.

27. The method as claimed in claim 26, further comprising the step of using at least one of the excited gaseous species and the ionized gaseous species to characterize a plasma etching process.

28. The method as claimed in claim 26, further comprising the step of using at least one of the excited gaseous species and the ionized gaseous species to characterize at least one of a chemical vapor deposition (CVD) process and a physical vapor deposition (PVD) process.

29. The method as claimed in claim 26, further comprising the step of using at least one of the excited gaseous species and the ionized gaseous species to characterize an abatement process.

30. The method as claimed in claim 26, further comprising the step of using at least one of the excited gaseous species and the ionized gaseous species to characterize an endpoint in at least one of a chamber cleaning process and a chamber conditioning process.

31. The method as claimed in claim 26, further comprising the step of using at least one of the excited gaseous species and the ionized gaseous species to detect a fault in a plasma etching process.

32. The method as claimed in claim 26, wherein the plurality of gaseous species are formed as part of at least one plasma process, the method further comprising creating a process table containing an acceptable range for the excited gaseous species and the ionized gaseous species during at least a portion of the at least one plasma process.

33. The method as claimed in claim 32, wherein the method further comprises the steps of:

performing the at least one plasma process an additional time;

colliding a plurality of additional effluent gas molecules from the at least one plasma process performed the additional time to produce additional excited and ionized gaseous species;

identifying said additional excited gaseous species from the at least one plasma process performed the additional time by measuring light emitted from said excited gaseous species;

identifying said additional ionized gaseous species from the at least one plasma process performed the additional time;

characterizing the at least one plasma process performed the additional time using the additional excited and ionized gaseous species from the at least one plasma process performed the additional time; and

declaring a fault when the at least one plasma process performed the additional time includes additional excited and ionized gaseous species outside of the acceptable range.

34. The method as claimed in any one of claims 8, 17 and 26, wherein the forming step further comprises the step of processing a gaseous stream of rare gas atoms using an electric field.

35. A plasma processing system comprising:

plasma processing chamber;

pump in fluid communication with the plasma processing chamber; and

monitoring system in fluid communication with the pump, wherein the monitoring system comprises:

an effluent system coupled to the pump,

excitation source coupled to the effluent system, and

monochromator coupled to the effluent system.

36. The plasma processing system as claimed in claim 35, further comprising a second pump coupled to the monitoring system.

37. The plasma processing system as claimed in claim 35, further comprising at least one controller coupled to the plasma processing chamber and the monitoring system.

38. The plasma processing system as claimed in claim 35, further comprising at least one mass spectrometer coupled to the monitoring system

39. A method for analyzing gaseous species, the method comprising the steps of:

performing at least one plasma process;

forming metastable atoms;

colliding a plurality of effluent gaseous species with said metastable atoms to form excited gaseous species;

identifying said excited gaseous species by measuring light emitted from said excited gaseous species;

characterizing the at least one plasma process using the excited gaseous species;

determining a change in the excited gaseous species over time; and

establishing an endpoint for the at least one plasma process based on the change in the excited gaseous species over time.

40. A method for analyzing gaseous species, the method comprising the steps of:

performing at least one plasma process;

forming metastable atoms;

colliding a plurality of effluent gaseous species with said metastable atoms to form ionized gaseous species;

identifying said ionized gaseous species;

characterizing the at least one plasma process using the ionized gaseous species;

determining a change in the ionized gaseous species over time; and

establishing an endpoint for the at least one plasma process based on the change in the ionized gaseous species over time.

41. A method for analyzing gaseous species, the method comprising the steps of:

performing at least one plasma process;

forming metastable atoms;

colliding a plurality of effluent gaseous species with said metastable atoms to form excited and ionized gaseous species;

identifying said excited gaseous species by measuring light emitted from said excited gaseous species;

identifying said ionized gaseous species;

characterizing the at least one plasma process using the excited and ionized gaseous species;

determining a change in the excited and ionized gaseous species over time; and

establishing an endpoint for the at least one plasma process based on the change in the excited and ionized gaseous species over time.